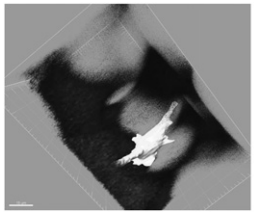
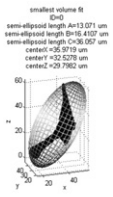
3375-Pos Board B480
Retrieval of a Metabolite from Cells with Polyelectrolyte Microcapsules
Studer Deborah, Raghavendra Palankar, Sebastian Springer, **Mathias Winterhalter**.
To monitor cellular processes in individual cells, it is important to measure the concentrations of intracellular metabolites and to retrieve them for analysis. The use of functionalized polyelectrolyte microcapsules as intracellular sensors for in vivo reporting is persented. Capsules loaded with streptavidin-rhodamine, which was introduced into fibroblasts by electroporation, autonomously escaped from an endocytic compartment and effi ciently recruited biotin-fluorescein from the cytosol. This work demonstrates the utility of polyelectrolyte microcapsules for intracellular capture of metabolites and eventually for drug delivery on an organismic level.
D. Studer et. al. Small (2010) in press.
R. Palankar et. al. Small 5 (2009) 2168-76.

3376-Pos Board B481
UV Laser Patterning of Various Polymers for Biocompatibility Control of Chondrocyte Adhesion and Differentiation Grade
Marc Fahrner, Bettina Reisinger, Sergii Yakunin, Christoph Romanin, Johannes Heitz.
The control of cell adhesion at polymer surfaces is of great interest for applications in medicine and biotechnology research. Chondrocytes, which are the only cells found in cartilage, have proven to rapidly dedifferentiate to a fibroblastic phenotype when cultured under 2D conditions. The dedifferentiated phenotype is characterized by a change in cell morphology which is round in case of chondrocytes and spindle shaped in case of dedifferentiated chondrocytes. Furthermore, the fibroblastic phenotype shows increased expression of collagen I relative to collagen II and Integrin $\alpha 11\beta 1$ relative to Integrin $\alpha 10\beta 1$. The aim of this study was to treat the surface of polystyrene (PS), perfluoro ethylene propylene (FEP) and polyethylene terephthalate (PET) by UV laser irradiation for the improvement of adhesion and differentiation grade of human chondrocytes.
Depending on the type of polymer and the micro- or nano-structures at the surfaces induced by the surface pretreatment, the chondrocytes showed round morphology and high cluster formation, low cluster formation, or nearly no cluster formation. In contrast, chondrocytes cultured in well plates without foils showed progressive spreading and spindle shaped morphology. (supported by FFG - NSI3).

3377-Pos Board B482
Analyzing the Morphology of 3T3 Fibroblasts in Microenvironment
Keng-hui Lin, Wei-jung Hong, Wan-jung Lin, David Camarillo, Daniel Jones.
We have created 3D ordered gelatin scaffolds with monodisperse pores and cultured 3T3 fibroblasts inside. We are interested to explore the effect of microenvironment on the cell morphologies. The morphologies of cells are observed through labeling the F-actin inside the cells with fluorescent phalloidin and imaged by a confocal microscope. We compare the cell morphologies in the following microenvironment - on a 2D hard surface, on a 2D soft gelatin surface, in a 3D collagen gel, and scaffolds of different pore sizes. We found that the cells exhibit wide range of morphologies in different microenvironment. We classified cell shapes into three categories and measured the extension of cells by fitting with an ellipsoid. From the trend of cell extensions, a cell in a large pore resembles one on 2D soft gel surface. This result suggests a crossover in length from 2D-like to 3D-like morphology for cell cultured on a curved surface.





3378-Pos Board B483
Low Energy Laser Light (632.8 nm) Suppresses Amyloid-Beta Peptide-Induced Oxidative and Inflammatory Responses in Astrocytes
Xiaoguang Yang, Sholpan Askarova, Wenwen Sheng, JK Chen, Albert Y. Sun, Grace Y. Sun, Gang Yao, James C.-M. Lee.
Oxidative stress and inflammation are important processes in the progression of Alzheimer's disease (AD). Recent studies have implicated the role of amyloid β-peptides (Aβ) in mediating these processes. In astrocytes, oligomeric Aβ induces the assembly of NADPH oxidase complexes resulting in its activation to produce anionic superoxide. Aβ also promotes production of pro-inflammatory factors in astrocytes. Since low energy laser has previously been reported to attenuate oxidative stress and inflammation in biological systems, the objective of this study was to examine whether this type of laser light was able to abrogate the oxidative and inflammatory responses induced by Aβ. Primary rat astrocytes were exposed to Helium-Neon laser (λ= 632.8 nm), followed by the treatment with oligomeric Aβ. Primary rat astrocytes were used to measure Aβ-induced production of superoxide anions using fluorescence microscopy of dihydroethidium (DHE), assembly of NADPH oxidase subunits by the co-localization between the cytosolic $p47^{phox}$ subunit and the membrane $gp91^{phox}$ subunit using fluorescent confocal microscopy, phosphorylation of cytosolic phospholipase A_2 ($cPLA_2$), and expressions of pro-inflammatory factors including interleukin-1β (IL-1β) and inducible nitric-oxide synthase (iNOS) using Western blot Analysis. Our data showed that laser light at 632.8 nm suppressed Aβ-induced superoxide production, colocalization between NADPH oxidase $gp91^{phox}$ and $p47^{phox}$ subunits, phosphorylation of $cPLA_2$, and the expressions of IL-1β and iNOS in primary astrocytes. We demonstrated for the first time that 632.8 nm laser was capable of suppressing cellular pathways of oxidative stress and inflammatory responses critical in the pathogenesis in AD. This study should prove to provide the groundwork for further investigations for the potential use of laser therapy as a treatment for AD.

Membrane Structure III

3379-Pos Board B484
The Effects of Long-Chain Base Methylations on Ceramide Molecular Properties in Bilayer Membranes
Terhi Maula, Mayuko Kurita, Shou Yamaguchi, Tetsuya Yamamoto, Shigeo Katsumura, J. Peter Slotte.
Structural modifications have position-dependent effects on the molecular properties of ceramides in bilayer membranes. Ceramides with additional chemical groups, such as triple bonds or cyclic structures, in the long-chain base near the head group region induce similar thermal stabilization and displacement of sterol from sphingomyelin (SM)-enriched domains as unmodified ceramides[1]. However, the ability to thermally stabilize bilayers is significantly altered for ceramides with varying acyl chain length[2]. In addition, we have shown that methyl-branches in the amide-linked acyl chain markedly alter the lateral distribution of ceramides in bilayers, affecting the ability of the ceramides to interact with SM to form gel-phases that exclude sterol[3]. This study aims to determine the effects of yet another kind of structural modification on ceramide molecular properties, namely introduction of a methyl-group either to the amide-link or the hydroxyl-group of the sphingosine base, or both (yielding NMeCer, OMeCer, and NMeOMeCer, respectively). The analogs were prepared by enzymatic release of ceramides from corresponding N- or O-methylated SMs, and their membrane properties were studied with different fluorescence based methods. The ability of the analogs to interact with SM to form gel-phase domains, and the possible displacement of sterol from such domains was determined from the quenching susceptibility of *trans*-parinaric acid in gel phases, and cholestatrienol in sterol-enriched domains. In addition, the overall affinity of sterol for bilayers containing the ceramide analogs was determined from an equilibrium distribution of cholestatrienol between the bilayers and methyl-β-cyclodextrin. The results are discussed in relation to possible ceramide functions in cell membranes. [1]Megha *et al*., 2007 Biochim Biophys Acta 1768: 2205-12. [2]Nybond *et al*., 2005 Biochim Biophys Acta 1718: 61-6. [3]Maula *et al*., Chem Phys Lipids 163S1: S2-3, 2010.

3380-Pos Board B485
Phospholipid Headgroup Charge Modifies Condensing Effect of Gangliosides on Lipid Films
Karlina Kauffman, Matthew T. Davidson, **Shelli L. Frey**.
In model membrane mixtures that mimic lipid raft compositions, the more ordered domains are enriched in the ganglioside, G_{M1}, a glycolipid with a headgroup containing four neutral sugars and a negatively charged sialic acid. To understand the organization and partitioning of G_{M1} in cell membranes, the outer leaflet of the cell membrane was modeled using Langmuir monolayers of dipalmitoylphosphatidylcholine (DPPC), a phospholipid with a zwitterionic headgroup, and varying concentrations of G_{M1}. At low biologically relevant concentrations, G_{M1} condenses the DPPC monolayer while at higher concentrations, it fluidizes, with a switch-over point between the two behaviors at a ratio of 3:1 DPPC:G_{M1}.
To examine the role of electrostatics, lipids with negatively charged phosphatidylglycerol (PG) and positively charged trimethylammonium-propane (TAP) headgroups were combined with various ratios of G_{M1}. Fluidity of the monolayer was systematically altered by changing the hydrocarbon tail length. Additivity plots constructed for all mixtures show negative deviations from ideal mixing or condensation of the monolayer regardless of headgroup charge. For the zwitterionic and negatively charged lipids, the greatest condensation effect